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(54) Disposable syringe with a retractable needle

Wegwerfbare Spritze mit einziehbarer Nadel

Seringue jettable avec une aiguille rétractable

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## Description

## BACKGROUND OF THE INVENTION

The present invention relates to a disposable syringe construction provided with a retractable or withdrawable needle.

As is known, a very important problem in making disposable syringes is that of providing a possibility of re-using said syringes and that of preventing the needle from accidentally injuring a user handling the needle syringe.

Prior solutions to solve the above mentioned problem usually provide to use syringes including resilient means for causing the syringe needle to be retracted inside the syringe.

These types of syringes, however, in addition to being very expensive, have the drawback that they involve a modification of the conventional use method of the syringes, since, as a puncture is performed thereby, it is anyhow usually necessary to overcome a resilient opposing force.

Other prior solutions, which do not provide to use resilient means, comprise connecting elements for coupling the needle to the syringe body, which connecting elements, however, do not provide a safe locking of the needle in its intended position and, moreover, being very complex from a construction standpoint.

WO-A-9112842 discloses a protection assembly for an injection syringe, comprising a piston 17 having a cavity 18 formed in its end face. Said cavity can engage claws 19 of a needle foot 20 of the syringe, the claws 19 then being bent and latching lugs 21 being released and the foot 20 being unlatched.

EP-A-0321903 describes a syringe having a needle which can be retracted within the barrel section. Means are provided for cocking the needle as it is retracted into the barrel.

## SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks, by providing a disposable syringe construction, including a retractable needle, which affords the possibility of causing the needle to be easily withdrawn inside the syringe body, without the need of using return springs, while also providing the possibility of safely locking the needle in its intended use position.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a disposable syringe construction affording the possibility of causing the needle to be withdrawn inside the syringe by using very simple and mechanically reliable means.

Another object of the present invention is to provide such a disposable syringe construction which can be made by very simple component elements, thereby providing great economic advantages.

Yet another object of the present invention is to pro-

vide such a disposable syringe construction which, owing to its construction features, is very reliable and safe in operation.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by the disposable syringe construction according to claim 1.

## BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, through not exclusive, embodiment of a disposable syringe construction, provided with a retractable needle, which is illustrated, by way of an indicative, but not limitative example, in the accompanying drawings, where:

Figure 1 is a schematic cross-sectional exploded view showing the cylindric body of the syringe with the needle thereof connected to a hub or barrel element;

Figure 2 is a schematic top plan view of the hub element;

Figure 3 illustrates a connection step for connecting said hub element with the syringe needle in the end-piece of the cylindric body;

Figure 4 illustrates the application of the collar to the syringe end-piece;

Figure 5 is a cross-sectional view illustrating a method for affixing the collar element included in the syringe by upsetting the forming material thereof;

Figure 6 is a cross-sectional view of the syringe in a ready of use condition;

Figure 7 represents the syringe at the end of a puncturing operation;

Figure 8 illustrates an operating step in which the piston element to which the syringe needle is connected is withdrawn;

Figure 9 is a cross-section view, on an enlarged scale, showing the syringe needle withdrawn inside the syringe cylindric body;

and

Figure 10 is a cross-sectional view illustrating an operating step in which the piston is broken so as to prevent the syringe from being re-used.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the number references of the above figures, the disposable syringe construction, provided with a retractable needle, according to the present invention, comprises a cylindric body 1 which is provided, at one end portion thereof, with an end-piece 2, to which a needle is connected, said needle being generally indicated at the reference number 3.

Inside the cylindric body 1, a piston can be

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die mit einer Nabe (11) verbunden ist, welche mit jedemden sich kontrahierenden Ansätzen (12, 13) mit Widerhaken (14) versehen ist, welche losbar in eine Ausnehmung (10) eingreifen, welche innerhalb des Endteiles sich befindet, wobei der Kolben an einem der Nadel zugewandten Endabschnitt mit einem Grundloch (30) versehen ist, welches durch einen Verschlussbund (31) verschlossen ist, wobei der Verschlussbund bei einem Eingriff mit der Nabe ein Kontrahieren der Ansätze verursacht, um die Widerhaken von der Ausnehmung zu lösen, und einen äußeren Bund (20), welcher weiterhin vorgesehen ist, an einem Endabschnitt des Endstückes angebracht zu werden, und der einen umgekippten Abschnitt am Ende des Endstückes bildet, um die Nabe und die benachbarte Nadel davor zu schützen, ausgeworfen zu werden, dadurch gekennzeichnet, daß ein Verschlusszahn (32) auf nur einer Seite der Ansätze vorgesehen ist zum Eingriff mit dem Verschlussbund, um die Nadel mit einer schräggestellten Anordnung unter Bezug auf die Achse des zylindrischen Körpers zu verbinden, wenn der Kolben herausgezogen wird, um ein Wiederauftauchen der Nadel zu verhindern.

2. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß die Nabe mit einer axialen Bohrung versehen ist, in welche die Spitze der Nadel eingreift, und daß die Ansätze ein paar gegenüberliegender Ansätze umfassen, welche mit den Haken versehen sind, die eine im wesentlichen 90°-Verbindung mit der Ausnehmung festlegen.
3. Spritze nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Kolben an einem Zwischenabschnitt seiner Stange mit Kerben versehen ist, die dazu angepaßt sind, einen Endabschnitt des Kolbens brechen zu können.

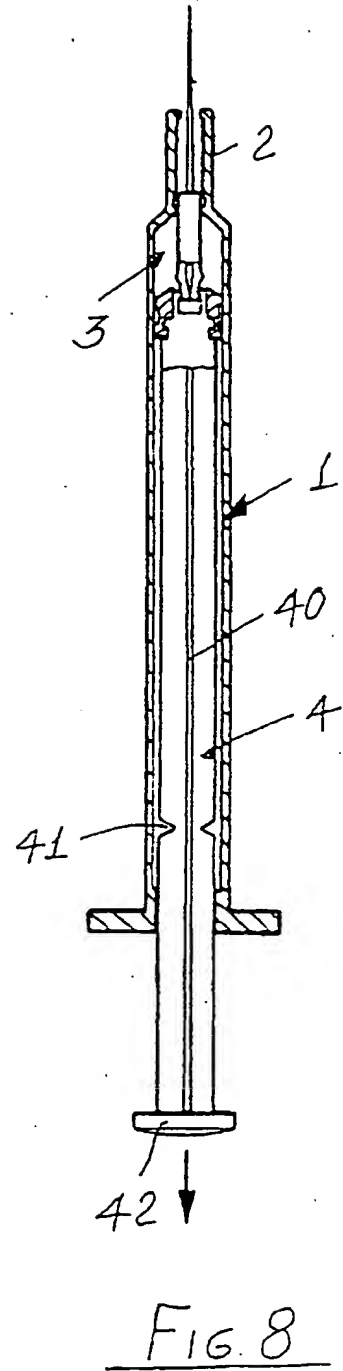
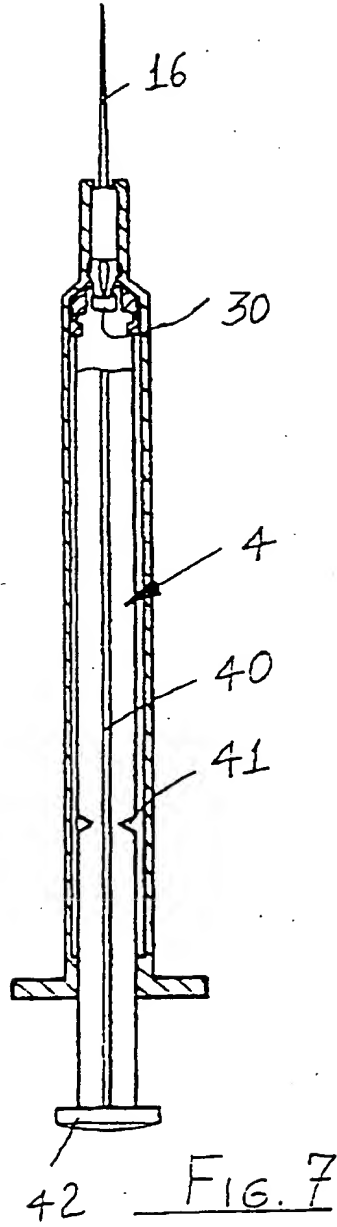
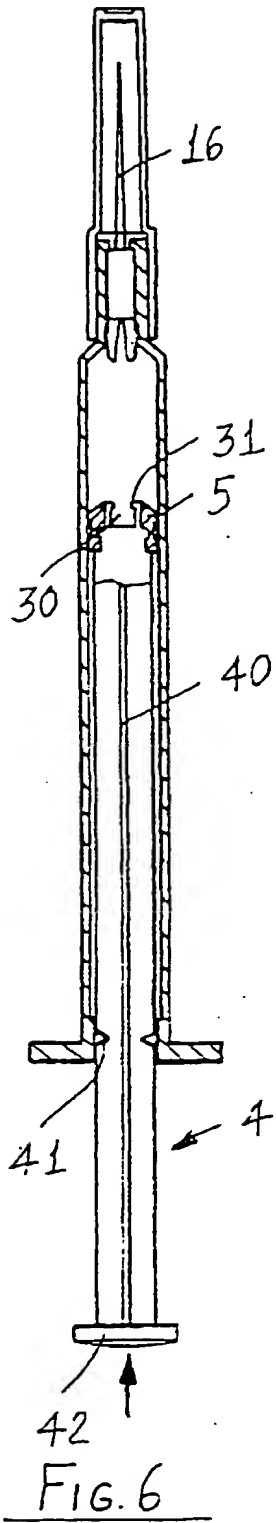
#### Revendications

1. Seringue jetable, pourvue d'une aiguille rétractable, comportant un corps cylindrique (1) définissant à une extrémité de celui-ci un embout pour connecter une aiguille (3) et étant ouvert à l'autre extrémité; un piston (4) pourvu d'un plongeur et introduit dans ledit corps cylindrique par l'extrémité ouverte de celui-ci; une aiguille (3) associée à un noyau (11) pourvu de languettes (12, 13) qui se contractent de manière élastique avec des pieds de butée qui s'engagent de façon amovible dans une découpeure (10) définie à l'intérieur de ladite extrémité, ledit piston étant pourvu, à une extrémité de celui-ci en face de ladite aiguille, d'un trou borgne (30) fermé par un collier de blocage (31), ledit collier de blocage,

pourvu de s'engager dans ledit moyeu/noyau, provoquant la contraction desdites languettes de façon à désengager lesdits pieds de butée de ladite découpeure, un collier extérieur (20) étant par ailleurs pourvu pour être appliqué sur une extrémité dudit embout et formant une partie de retoulement sur l'extrémité dudit embout de manière à empêcher ledit moyeu/noyau et son aiguille associée d'être éjectés vers l'extérieur, caractérisée en ce qu'une dent de retenue (32) est pourvue sur une languette pour être engagée dans ledit collier de blocage pour que l'aiguille adopte une position inclinée par rapport à l'axe dudit corps cylindrique, lorsque ledit piston est retiré de manière à empêcher que ladite aiguille ressorte.

2. Seringue, selon la revendication 1, caractérisée en ce que ledit noyau est pourvu d'un trou axial dans lequel s'engage la pointe de l'aiguille, et en ce que lesdites languettes comportent une paire de languettes opposées, pourvues desdits pieds définissant un couplage sensiblement à 90°.
3. Seringue, selon une ou plusieurs des revendications précédentes, caractérisée en ce que ledit piston est pourvu, à une partie intermédiaire de sa tige, d'encoches adaptées pour permettre à une extrémité dudit piston d'être cassée.

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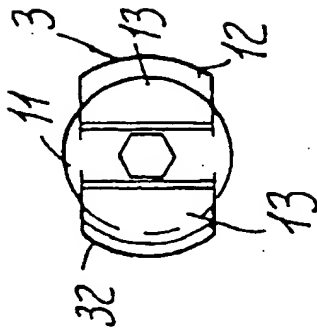


FIG. 2

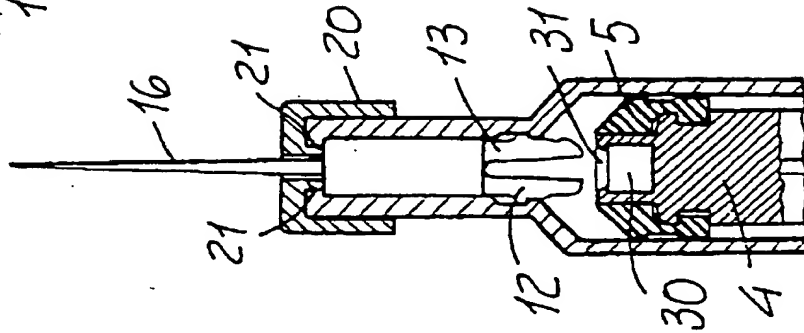


FIG. 5

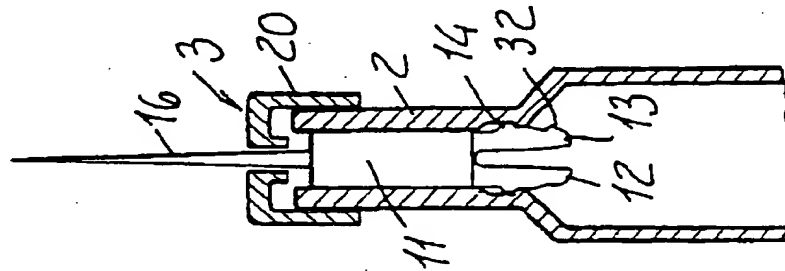


FIG. 4

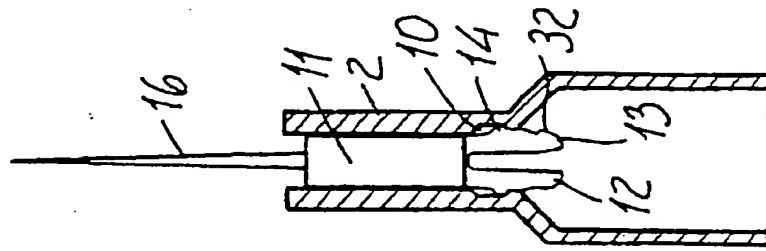


FIG. 3

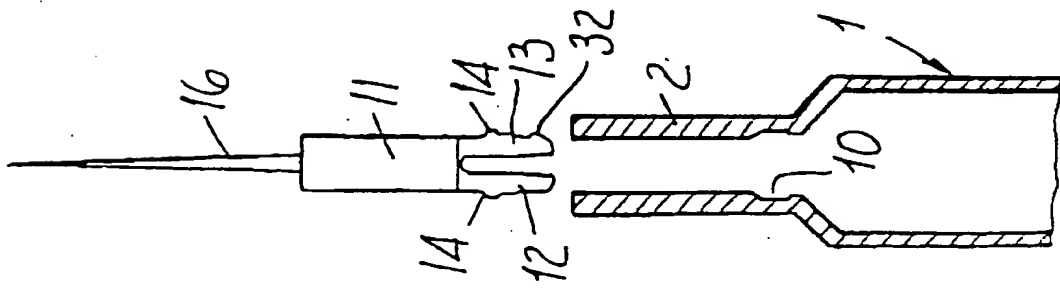


FIG. 1

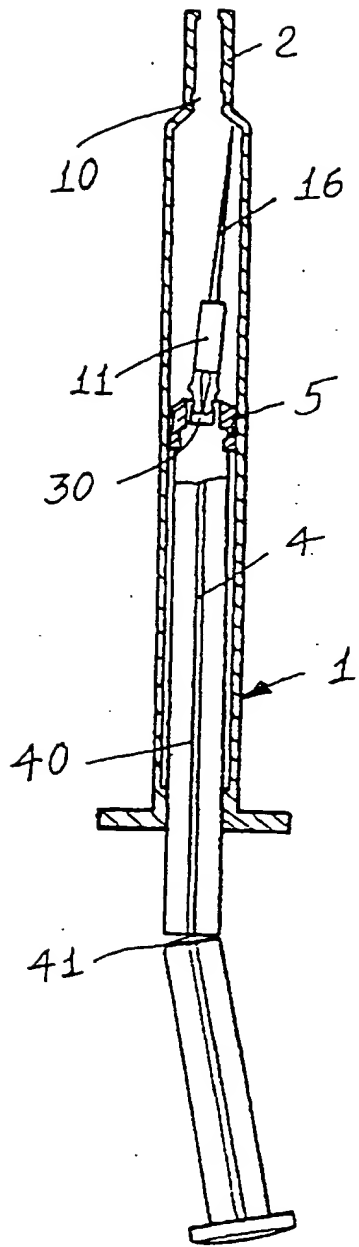


FIG. 10

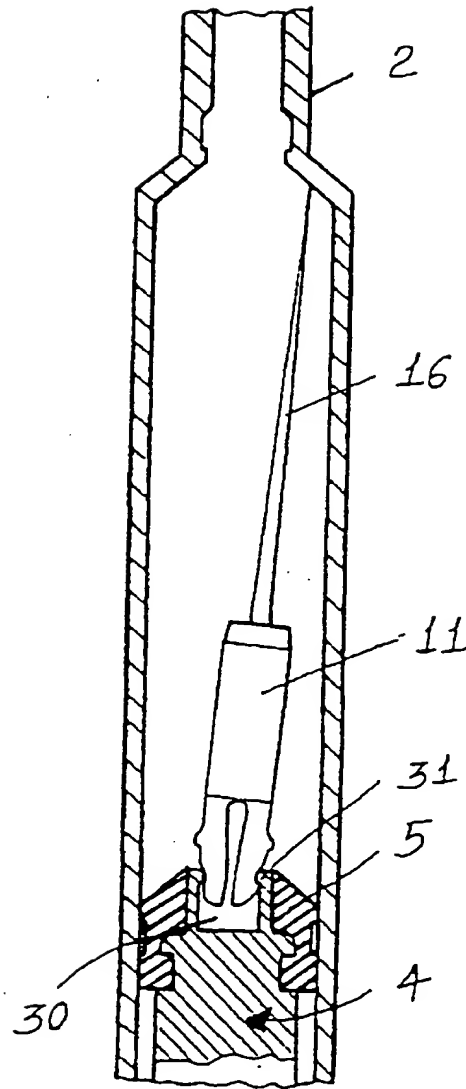


FIG. 9

engaged, generally indicated at the reference number 4, said piston being provided with a sealing gasket or rubber sealing element 5.

A first main feature of the present invention is that the end-piece 2 is provided, in its inside, with a cut-out portion 10 which operates as an engagement element for the drum portion or hub 11 of the needle 3.

More specifically, this drum or hub portion 11 is provided, at its inner end portion, with opposite lugs 12 and 13, which can be resiliently contracted, and including abutment legs 14 engaging in said cut-out 10 so as to prevent the needle from being withdrawn inside the cylindric body 1.

Moreover, the drum or hub 11 is provided with a polygonal hole 15, in which there is force engaged, in a per se known manner, the point 16 of the needle 3.

In order to provide a firm connection, after having introduced the needle 3 by urging the hub so as to cause the abutment legs 14 of the hub to be engaged in the cut-out 10, an outer collar 20 is applied, which, more specifically, is applied on the end portion of the end-piece 2 and being urged so as to upset the material, at the end of the end-piece, to provide a narrowing region, indicated at 21 in figure 5, adapted to operate as a locking element for preventing the needle 3 from being withdrawn from the cylindric body.

As shown, the piston 4 is provided, at the end portion of the plunger 5, with a blind hole 30, including a locking collar 31, adapted for engagement with the ends of the lugs 12 and 13 of the hub 11 of the needle 3, so as to cause them to be contracted, thereby causing said lugs to be connected inside the hole or seat 20, and a locking of the tooth element 32, provided on one of the lugs, for example the lug 13, with respect to the locking collar 31.

Thus, the needle is made rigid with the end portion of the piston.

By exerting a pulling force, and owing to the fact that the lugs 12 and 13 have been contracted, the legs 14 are disengaged from the cut-out 10, thereby the needle can be also disengaged and caused to be withdrawn inside the cylinder.

The provision of a single lug with a locking element, whereas the other lug operates as a guide element, causes the needle, as it is withdrawn inside the cylinder 11, to be tilted through few degrees, usually about 5°.

Thus, the needle point will be laterally displaced, thereby the needle can not be further withdrawn for a possible re-use of the syringe.

Moreover, as shown, the stem or rod 40 of the piston 4 is provided with notches 41, at an intermediate portion thereof, allowing the stem or rod to be easily broken, by removing the end portion including the push-button element 42, in order to provide a pushing force.

With the disclosed arrangement, there is provided a very functional syringe which can not be re-used, which is obtained by very simple means and which, anyhow, is specifically adapted to allow the needle to be always firmly held in its use position, whereas it is safely dis-

gaged as the piston is withdrawn again.

The invention as disclosed is susceptible to several modifications and variations all of which will come within the scope of the inventive idea.

## Claims

1. A disposable syringe construction, provided with a retractable needle, comprising: a cylindric body (1) defining, at an end portion thereof, an end-piece (2) for connecting a needle (3) and being open, at another end portion thereof; a piston (4) provided with a plunger and introduced into said cylindric body through the open end portion thereof; a needle (3) coupled to a hub (11) provided with resiliently contracting lugs (12,13) with abutment legs (14) removably engaging with a cut-out (10) defined inside said end-piece, said piston being provided, at an end portion thereof facing said needle, with a blind hole (30) closed by a locking collar (31), said locking collar, as it is engaged with said hub, causing said lugs to be contracted so as to disengage said abutment legs from said cut-out, an outer collar (20) being moreover provided to be applied on an end-portion of said end-piece and forming an upset portion on the end of said end piece so as to prevent said hub and related needle from being outwardly ejected, characterised in that a locking tooth (32) is provided on only one of said lugs for engagement with said locking collar to cause said needle to be arranged with a slanted arrangement with respect to the axis of said cylindric body as said piston is withdrawn so as to prevent said needle from reemerging.
2. A syringe according to Claim 1, characterized in that said hub is provided with an axial hole in which the tip of the needle is engaged, and in that said lugs comprise a pair of opposite lugs, provided with said legs defining a substantially 90° coupling with said cut-out.
3. A syringe according to one or more of the preceding claims, characterized in that said piston is provided, at an intermediate portion of its rod, with notches adapted to allow an end portion of said piston to be broken.

## Patentansprüche

1. Wegwerfbarer Spritzenaufbau, versehen mit einer einziehbaren Nadel, welcher folgendes aufweist: einen zylindrischen Körper (1), welcher an einem Endabschnitt desselben ein Endstück (2) zur Verbindung mit einer Nadel (3) bestimmt, und der an einem anderen Endabschnitt offen ist; einen Kolben (4), der mit einem Stößel versehen ist, und der in den zylindrischen Körper durch den offenen Endabschnitt desselben eingeführt ist; eine Nadel (3),



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Es wird hiermit bescheinigt, daß für die in der beigefügten Patentschrift beschriebene Erfindung ein europäisches Patent für die in der Patentschrift bezeichneten Vertragsstaaten erteilt worden ist.

It is hereby certified that a European patent has been granted in respect of the invention described in the annexed patent specification for the Contracting States designated in the specification.

Il est certifié qu'un brevet européen a été délivré pour l'invention décrite dans le fascicule de brevet ci-joint, pour les Etats contractants désignés dans le fascicule de brevet.

**Europäisches Patent Nr.**

**European Patent No.**

**Brevet européen n°**

**0636381**

**Patentinhaber**

**Proprietor of the Patent**

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**13.08.97**

  
**Ingo Kober**

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